

CLAIMS

1. A process for preparing a cationic nanoemulsion, comprising

- 5 (a) mixing, with agitation, at least one fatty compound and at least one non-ionic surfactant at a temperature T_m above the melting point of the at least one fatty compound and the at least one non-ionic surfactant under normal atmospheric pressure,
10 wherein the at least one non-ionic surfactant and the at least one fatty compound are present in amounts suitable to form an oil-in-water emulsion with water;
- (b) adding water, with agitation, to form an oil-in-
15 water nanoemulsion, and
- (c) adding at least one cationic surfactant to the nanoemulsion.

2. The process according to Claim 1, wherein the T_m is from about 20°C to about 100°C.

- 20 3. The process according to Claim 1, wherein the weight ratio τ of the at least one fatty compound to the at least one non-ionic surfactant is not more than 2.

4. The process according to Claim 3, wherein
25 the weight ratio τ of the at least one fatty compound to the at least one non-ionic surfactant is from 0.1 to 1.5.

5. The process according to Claim 3, wherein the weight ratio τ of the at least one fatty compound to the at least one non-ionic surfactant is from 0.1 to 1.

5 6. The process according to Claim 1, further comprising cooling the nanoemulsion to about 20°C before the at least one cationic surfactant is added in (c).

7. The process according to Claim 1, further
10 comprising cooling the nanoemulsion to about 20°C after the at least one cationic surfactant is added in (c).

8. The process according to Claim 1, wherein the at least one cationic surfactant is added in the form of an aqueous solution or dispersion.

15 9. The process according to Claim 1, wherein the at least one fatty compound is selected from group consisting of fatty acid esters, transesterified vegetable oils, non-transesterified vegetable oils, and mixtures thereof.

20 10. The process according to Claim 1, wherein the at least one fatty compound is selected from the group consisting of a compound of the formula R_aCOOR_b , in which R_a is a radical of a saturated or unsaturated higher fatty acid containing from 6 to 29
25 carbon atoms and R_b is a saturated or unsaturated hydrocarbon chain containing from 1 to 30 carbon atoms; sweet-almond oil, avocado oil, castor oil, olive oil,

jojoba wax, sunflower oil, wheatgerm oil, sesame oil, groundnut oil, grape seed oil, soya oil, colza oil, safflower oil, copra oil, maize oil, hazelnut oil, shea butter, palm oil, apricot kernel oil, calophyllum oil;
5 olive oil transesterified with hexanol, jojoba wax transesterified with ethanol; and mixtures thereof.

11. The process according to Claim 10, wherein the at least one fatty compound is a compound of the formula $R_a\text{COOR}_b$ and wherein R_a is a radical of a
10 saturated or unsaturated higher fatty acid containing from 8 to 22 carbon atoms.

12. The process according to Claim 10, wherein the at least one fatty compound is a compound of the formula $R_a\text{COOR}_b$ and wherein R_b is a radical of a
15 saturated or unsaturated hydrocarbon chain containing from 1 to 12 carbon atoms

13. The process according to Claim 10, wherein the at least one fatty compound is selected from the group consisting of isopropyl myristate,
20 isononyl isononanoate, jojoba wax, olive oil transesterified with hexanol, jojoba wax transesterified with ethanol, and mixtures thereof.

14. The process according to Claim 1, wherein at least two non-ionic surfactants are mixed in
25 step (a).

15. The process according to Claim 1, wherein the at least one non-ionic surfactant is

selected from the group consisting of polyalkoxylated hydrogenated vegetable oils, polyalkoxylated non-hydrogenated vegetable oils, polyalkoxylated hydrogenated C₈₋₃₀ fatty acid monoglycerides, 5 polyalkoxylated non-hydrogenated C₈₋₃₀ fatty acid monoglycerides, polyalkoxylated hydrogenated C₈₋₃₀ fatty acid diglycerides, polyalkoxylated non-hydrogenated C₈₋₃₀ fatty acid diglycerides, polyalkoxylated hydrogenated C₈₋₃₀ fatty acid triglycerides, polyalkoxylated non- 10 hydrogenated C₈₋₃₀ fatty acid triglycerides, polyethoxylated alcohols, polypropoxylated alcohols, polyethoxylated alpha-diols, polypropoxylated alpha-diols, polyethoxylated alkylphenols having a fatty chain, polypropoxylated alkylphenols having a fatty 15 chain, ethylene oxide/propylene oxide copolymers, condensation products of ethylene oxide and propylene oxide with fatty alcohols; polyethoxylated fatty amides having from 2 to 30 mol of ethylene oxide, polyglycerolated fatty amides containing an average of 20 1 to 5 glycerol groups; fatty acid esters of sorbitan, polyethoxylated fatty acid esters of sorbitan having from 2 to 30 mol of ethylene oxide; fatty acid esters of sucrose, fatty acid esters of polyethylene glycol, C₈₋₃₀ fatty acid esters of polyglycerol, 25 alkylpolyglycosides, N-alkylglucamine derivatives, amine oxides, and mixtures thereof.

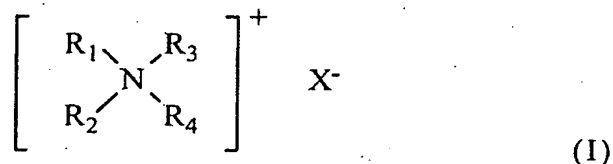
16. The process according to Claim 15,
wherein the at least one non-ionic surfactant is
selected from the group consisting of polyalkoxylated
hydrogenated vegetable oils containing from 2 to 50 mol
5 of alkylene oxide, polyalkoxylated non-hydrogenated
vegetable oils containing from 2 to 50 mol of alkylene
oxide, polyalkoxylated hydrogenated C₈₋₃₀ fatty acid
monoglycerides containing from 2 to 50 mol of alkylene
oxide, polyalkoxylated non-hydrogenated C₈₋₃₀ fatty acid
10 monoglycerides containing from 2 to 50 mol of alkylene
oxide, polyalkoxylated hydrogenated C₈₋₃₀ fatty acid
diglycerides containing from 2 to 50 mol of alkylene
oxide, polyalkoxylated non-hydrogenated C₈₋₃₀ fatty acid
diglycerides containing from 2 to 50 mol of alkylene
15 oxide, polyalkoxylated hydrogenated C₈₋₃₀ fatty acid
triglycerides containing from 2 to 50 mol of alkylene
oxide, polyalkoxylated non-hydrogenated C₈₋₃₀ fatty acid
triglycerides containing from 2 to 50 mol of alkylene
oxide, polyethoxylated alcohols containing from 2 to 50
20 ethylene oxide groups, polypropoxylated alcohols
containing from 2 to 50 propylene oxide groups,
polyethoxylated alpha-diols containing from 2 to 50
ethylene oxide groups, polypropoxylated alpha-diols
containing from 2 to 50 propylene oxide groups,
25 polyethoxylated alkylphenols having a fatty chain
containing from 2 to 50 ethylene oxide groups,
polypropoxylated alkylphenols having a fatty chain

containing from 2 to 50 propylene oxide groups,
 polyglycerolated fatty acid amides containing an
 average of from 1.5 to 4 glycerol groups, (C₁₀-C₁₄-
 alkyl)amine oxides, N-acylaminopropylmorpholine oxides,
 5 and mixtures thereof.

17. The process according to Claim 15,
 wherein the at least one non-ionic surfactant is
 selected from the group consisting of polyethoxylated
 hydrogenated castor oil with 35 EO, polyethoxylated
 10 hydrogenated castor oil with 7 EO, polyethoxylated
 olive oil with 7 EO, sorbitan monooleates with 4 EO, 5
 EO or 20 EO, (C₁₂-C₁₄-alkyl)glycosides, (C₈-C₁₄-alkyl)-
 glycosides, glycerol monostearate with 30 EO, deca-
 glyceryl monooleate, polyethoxylated oleyl alcohol with
 15 2 or 10 EO, polyethoxylated lauryl alcohol with 7 EO,
 methylglucoside dioleate, and mixtures thereof.

18. The process according to Claim 1,
 wherein the cationic surfactant is selected from the
 group consisting of:

20 a compound of formula (I):

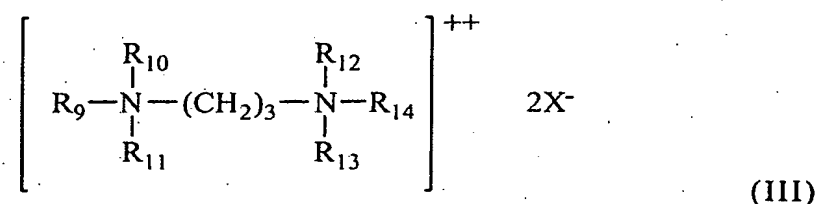


wherein R₁ to R₄, which can be identical or different,
 are a linear or branched aliphatic radical containing
 from 1 to 30 carbon atoms or an aromatic radical; and X
 25 is an anion selected from the group consisting of

halides, phosphates, acetates, lactates, alkyl (C₁-C₆) sulphates, (C₁-C₆-alkyl) sulphonates, and (C₁-C₆-alkyl) arylsulphonates;

a quaternary ammonium salt of imidazoline;

5 a quaternary diammonium salt of formula (III):



wherein R₉ is an aliphatic radical containing from about
 10 16 to about 30 carbon atoms, R₁₀, R₁₁, R₁₂, R₁₃ and R₁₄,
 which are identical or different, are selected from the
 group consisting of hydrogen and an alkyl radical
 containing from 1 to 4 carbon atoms; and X is an anion
 selected from the group consisting of halides,
 15 acetates, phosphates, nitrates and methylsulphates; and
 a quaternary ammonium salt comprising at least one
 ester group.

19. The process according to Claim 18,
 wherein the cationic surfactants are selected from the
 20 group consisting of palmityl-
 amidopropyltrimethylammonium chloride, cetyltrimethyl-
 ammonium chloride, and behenyltrimethylammonium
 chloride.

20. The process according to Claim 1,
wherein the at least one fatty compound is present in
an amount of from 1 to 30% by weight based on the total
weight of the cationic nanoemulsion.

5 21. The process according to Claim 20,
wherein the at least one fatty compound is present in
an amount of from 1 to 20% by weight based on the total
weight of the cationic nanoemulsion.

22. The process according to Claim 1,
10 wherein the at least one non-ionic surfactant is
present in an amount of from 2 to 30% by weight based
on the total weight of the cationic nanoemulsion.

23. The process according to Claim 22,
wherein the at least one non-ionic surfactant is
15 present in an amount of from 2 to 20% by weight based
on the total weight of the cationic nanoemulsion.

24. The process according to Claim 1,
wherein the water is present in an amount of from 40 to
97% by weight based on the total weight of the cationic
20 nanoemulsion.

25. The process according to Claim 24,
wherein the water is present in an amount of from 50 to
90% by weight based on the total weight of the cationic
nanoemulsion.

25 26. The process according to Claim 1,
wherein the at least one cationic surfactant is present

in an amount of from 0.1 to 10% by weight based on the total weight of the cationic nanoemulsion.

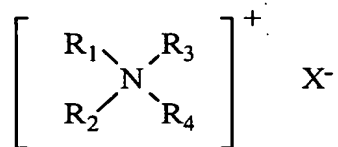
27. The process according to Claim 26,
wherein the at least one cationic surfactant is present
5 in an amount of from 0.2 to 6% by weight based on the total weight of the cationic nanoemulsion.

28. A cationic nanoemulsion obtainable by the process according to Claim 1.

29. A cosmetic composition comprising the
10 cationic nanoemulsion according to Claim 28, and at least one additional cosmetically acceptable ingredient.

30. A cationic nanoemulsion comprising particles with a number-average size not greater than
15 100 nm, at least one fatty compound, 2 to 30% by weight of at least one non-ionic surfactant, at least one cationic surfactant, and water, wherein the weight ratio τ of the at least one fatty compound to the at least one non-ionic surfactant is from 0.1 to 1.5,
20 wherein the at least one cationic surfactant is selected from the group consisting of:

a compound of formula (V):

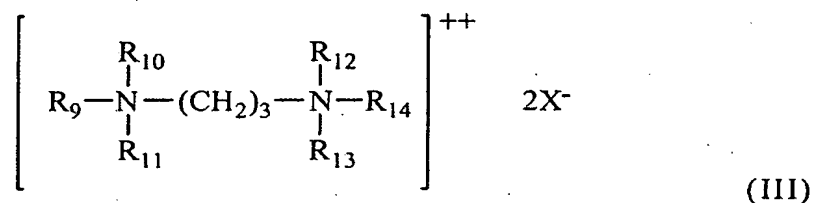


wherein R₁ is a linear or branched aliphatic
25 radical containing from 8 to 30 carbon atoms or an aromatic radical, R₂ to R₄, which can be identical or

different, are a linear or branched aliphatic radical containing from 1 to 6 carbon atoms; and X is an anion selected from the group consisting of halides, phosphates, acetates, lactates, alkyl(C₁-C₆)sulphates, (C₁-C₆-alkyl)sulphonates and (C₁-C₆-alkyl)aryl-sulphonates;

a quaternary ammonium salt of imidazoline;

a quaternary diammonium salt of formula (III):



10

wherein R₉ is an aliphatic radical containing from about 16 to about 30 carbon atoms, R₁₀, R₁₁, R₁₂, R₁₃ and R₁₄, which are identical or different, are selected from the group consisting of hydrogen and an alkyl radical containing from 1 to 4 carbon atoms, and X is an anion selected from the group consisting of halides, acetates, phosphates, nitrates and methylsulphates; and a quaternary ammonium salt containing at least one ester group.

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31. The cationic emulsion according to Claim 30, wherein the weight ratio τ of the at least one fatty compound to the at least one non-ionic surfactant is from 0.1 to 1.

32. The cationic nanoemulsion according to Claim 30, which comprises at least two non-ionic surfactants.

33. The cationic nanoemulsion according to Claim 30, wherein the weight ratio of the at least one fatty compound to the at least one non-ionic surfactant and the at least one cationic surfactant(s) is not more than 1.5.

34. The cationic nanoemulsion according to Claim 30, wherein the weight ratio of the at least one fatty compound to the at least one non-ionic surfactant and the at least one cationic surfactant(s) is from 0.1 to 1.

35. A cosmetic composition comprising the cationic nanoemulsion according to Claim 30 and at least one additional cosmetically acceptable ingredient.

36. The cosmetic composition according to Claim 35, wherein the at least one additional cosmetically acceptable ingredient is selected from the group consisting of cationic polymers; anionic polymers; non-ionic polymers; amphoteric polymers; modified non-volatile silicones; unmodified non-volatile silicones; associative or non-associative, natural or synthetic, anionic, amphoteric, zwitterionic, non-ionic or cationic polymeric thickeners; non-polymeric thickeners; perfumes;

colorants; organic particles; mineral particles; preservatives; and pH stabilizers.

37. A method of treating and/or conditioning hair comprising applying the cosmetic composition of
5 Claim 29 to the hair to treat and/or condition the hair.

38. The method according to Claim 37, wherein said applying is prior to shampooing, dyeing, perming, bleaching, and/or straightening the hair.

10 39. The method according to Claim 37, wherein said applying is after shampooing, dyeing, perming, bleaching, and/or straightening the hair.

40. A method of treating and/or conditioning hair comprising applying the cosmetic composition of
15 Claim 35 to the hair to treat and/or condition the hair.

41. The method according to Claim 40, wherein said applying is prior to shampooing, dyeing, perming, bleaching, and/or straightening the hair.

20 42. The method according to Claim 40, wherein said applying is after shampooing, dyeing, perming, bleaching, and/or straightening the hair.